

What is claimed is:

1. A furnace comprising:

a combustion zone for burning materials, and

a path for feeding flue gas back to the combustion zone so as to control a temperature in said combustion zone, and means for heating water by the flue gas.
2. The furnace of claim 1, wherein said materials to be burned are solid materials, and said temperature is a temperature of said solid materials.
3. The furnace of claim 2, wherein said solid materials comprise a residual ash, and said temperature is controlled to be lower than a softening point of said residual ash.
4. The furnace of claim 1, further comprising means for introducing water vapor into said combustion zone.
5. The furnace of claim 4, wherein said water vapor is generated from the water heated by said flue gas.
6. The furnace of claim 5, wherein said water vapor is generated by adding the water into said feeding path so as to be heated by said flue gas.
7. The furnace of claim 1, wherein said furnace is a counter-flow multiple hearth furnace further comprising a drying or feed zone above said combustion zone and a cooling zone under said combustion zone, in which said solid materials enter said combustion zone from above through said drying or feed zone while air for burning enters said combustion zone from below through said cooling zone.

8. The furnace of claim 7, wherein said path is arranged to feed said flue gas from said drying or feed zone back to said combustion zone.
9. The furnace of claim 8, wherein said path is arranged to feed said flue gas from said drying or feed zone via said cooling zone back to said combustion zone together with said air.
10. A flue gas recirculation system in a furnace having a combustion zone, comprising a recirculation path for feeding flue gas generated from said combustion zone back to said combustion zone, and means for heating water with the flue gas.
11. The flue gas recirculation system of claim 10, wherein the water is heated to generate water vapor.
12. The flue gas recirculation system of claim 11, further comprising means for introducing said water vapor into said combustion zone.
13. The flue gas recirculation system of claim 12 further comprising means for introducing the water into said recirculation path so that the water is heated and thus vaporized into the water vapor by said flue gas.
14. The flue gas recirculation system of claim 13, wherein said water vapor is fed into said combustion zone together with said flue gas.
15. A method of controlling the combustion in a furnace, comprising the steps of introducing flue gas generated from a combustion zone back into said combustion zone, and heating water by said flue gas.
16. The method of claim 15, further comprising the step of controlling an amount of said flue gas to be fed back to said combustion zone.

17. The method of claim 16, wherein said amount is controlled according to a temperature of said combustion zone.
18. The method of claim 17, wherein said temperature is a temperature of solid materials to be burned in said combustion zone.
19. The method of claim 18, wherein said amount is controlled such that said temperature is below a softening point of a residual ash in said solid materials.
20. The method of claim 15, wherein water vapor is generated by the step of heating the water.
21. The method of claim 20, further comprising the step of introducing said generated water vapor into said combustion zone.
22. The method of claim 21, said step of heating comprises a step of adding water into said flue gas.
23. The method of claim 22, wherein said water vapor is introduced to said combustion zone together with said flue gas.